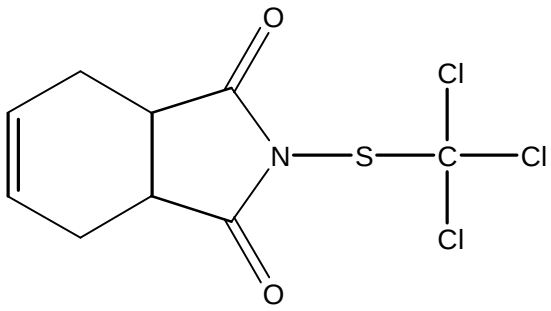
California Department of Pesticide Regulation

Toxic Air Contaminant Program
Fact Sheet

Captan



I. Introduction

Legislation passed in 1983 and 1984 established a regulatory framework for the identification and control of toxic air contaminants (TACs). Assembly Bills 1807 and 3219 mandate that the Department of Pesticide Regulation (DPR) declare and regulate pesticides that have been identified as TACs (Food & Agr. Code, § 14021 et seq.). The statute defines TACs as air pollutants "...which may cause or contribute to an increase in mortality or an increase in serious illness...or pose a present or potential hazard to human health". Pesticides which have been identified as federal hazardous air pollutants (HAPs) are also TACs. Captan is a HAP and was designated a TAC in 1993.

This fact sheet provides a brief overview of physical and chemical properties of captan, its application and use patterns in California, and its persistence and fate in the environment. The results of the monitoring study conducted by the Air Resources Board to document concentrations of captan in ambient air is also summarized.

II. Properties, Persistence, and Fate of Captan

Common Name:	captan
Chemical Name:	3a,4,7,7a-tetrahydro-2-[(trichloromethyl)thio]-1H-isoindole-1,3(2H)-dione
Trade Names:	Orthocide® (Chevron); Captan 400® (Gustafson); Criptane® (VAPCO)
CAS Registry Number:	133-06-2
Molecular Formula:	$C_9H_8Cl_3NO_2S$
Molecular Weight:	300.61

Captan is a non-corrosive crystalline powder with a slightly pungent odor. It decomposes at or near the melting point of 178 EC to corrosive products. Captan undergoes slow neutral or acidic hydrolysis and rapid hydrolysis under alkaline conditions. It is slightly soluble in water but very soluble in common organic solvents such as benzene, toluene, xylene, and acetone, and insoluble in petroleum oils (British Crop Protection Council, 1994; Royal Society of Chemistry, 1994). Additional physical and chemical properties (Kollman and Segawa, 1995) are summarized below.

Physical/Chemical Property	**Value**
Water Solubility	3.3 parts per million
Vapor Pressure	7.78×10^{-8} mm Hg, 25 EC
Octanol-water Partition Coefficient	605
Hydrolysis Half-life	0.49 day, at 25 EC and pH 5
Aerobic Soil Metabolism Half-life	1.2 day, in sandy loam soil
Anaerobic Soil Metabolism Half-life	less than 0.69 day, in sandy loam soil
Field Dissipation Half-life	4 days, averaged over different soil types
Henry's Law Constant	6.2×10^{-9} atm-m^3/mol, 25EC

Captan is rapidly degraded in soil to tetrahydrophthalimide (THPI), the primary breakdown product, and tetrahydrophthalamic acid (Pack, 1974). There is no information available on its persistence and fate in air.

III. Application Methods and Use Patterns of Captan

Captan is a protective and curative fungicide used in a wide variety of crops to control fungal diseases such as brown rot, Botrytis spp, and leafspot. It is available in flowable concentrate, wettable powder, aqueous concentrate, and dust/powder formulations. As of March 1999, there are twelve active registrations for agricultural use products containing captan. Captan is applied as a foliar spray, a preplant soil treatment, or seed treatment at application rates ranging from 2 to 4.5 pounds of active ingredient per acre. Application rates for seed treatments range from 0.03 to 0.4 pounds of active ingredient per 100 pounds of seed. Captan is regulated as a restricted material in California and may only be applied under permit and use conditions administered by the county agricultural commissioners (Thomson, 1993; DPR, 1999).

Full pesticide use reporting was implemented by DPR in 1990. All agricultural use must be reported monthly to the county agricultural commissioners. These data are subsequently forwarded to DPR, who compiles and publishes an annual Pesticide Use Report (PUR). Based on PUR data for 1993 through 1996, nearly 697,000 pounds of captan are applied annually in California. Seventy-six percent of the total pounds used are applied in 10 counties (Fig. 1). The total population of these counties constitutes almost 13 percent of the total population of California (1990 census data). Fifteen percent (approximately 103,000 pounds) is applied in Kern County. The period of peak use occurs during the spring months with the greatest use in March (Fig. 2). Figure 3 shows that 47 percent of all captan used is applied to almonds (DPR, 1993; DPR, 1994; DPR, 1995; DPR, 1996).

Figure 1. Average Annual Use of Captan by County (1993-1996)

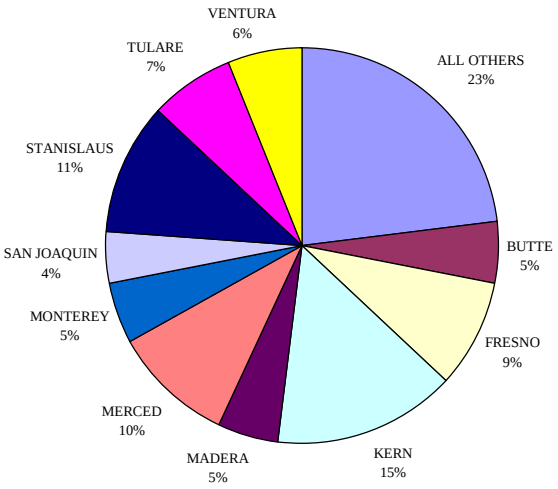
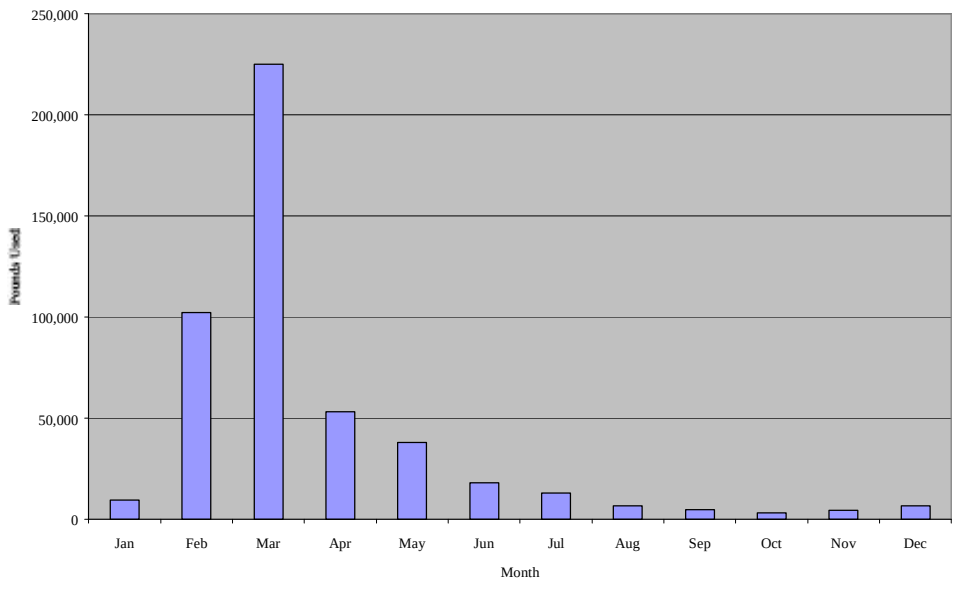
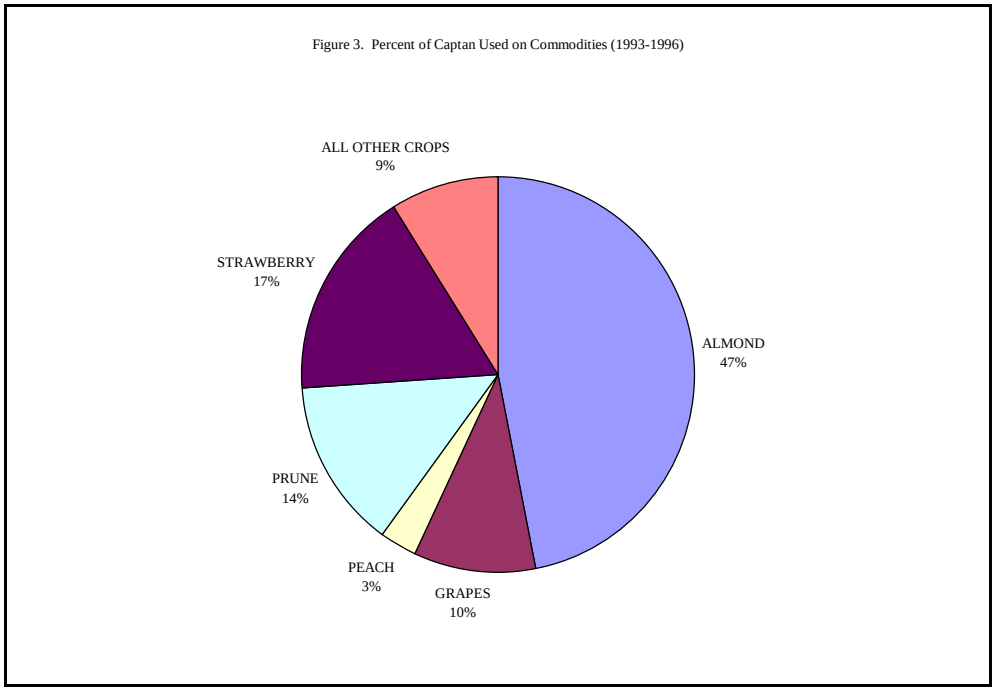


Figure 2. Average Monthly Use of Captan (1993-1996)



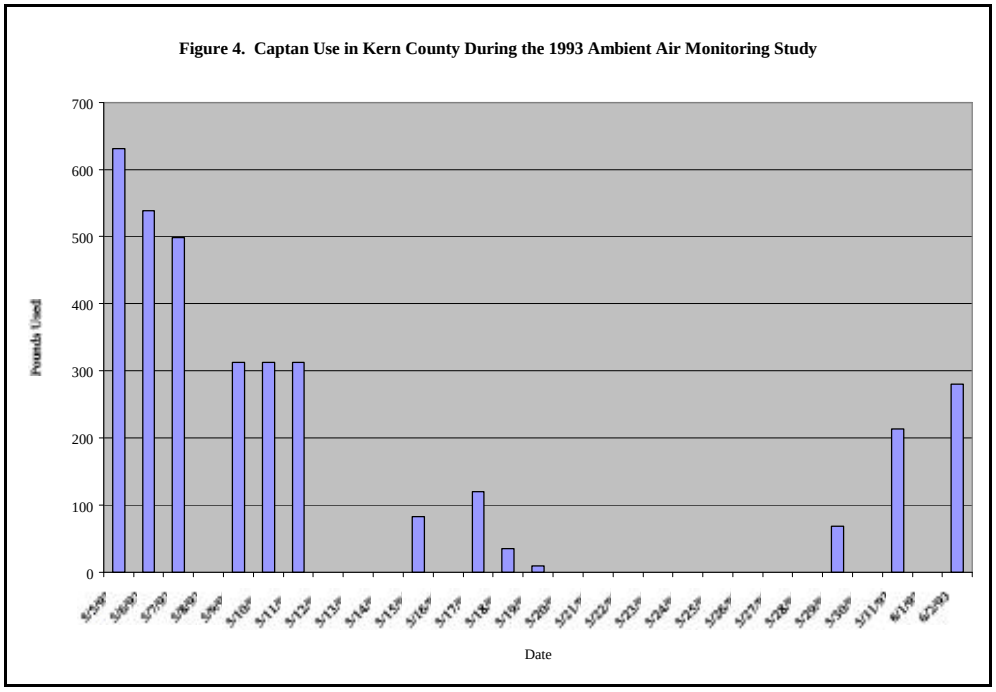


IV. Documentation of Airborne Concentrations of Captan

At the request of DPR, the Air Resources Board (ARB) conducted an air monitoring program during the spring of 1993 to document airborne concentrations of captan. The monitoring program consisted of determining concentrations of captan in the ambient air of populated areas, and in the vicinity of an application site (ARB, 1994).

Ambient air monitoring for captan and the primary breakdown product THPI was conducted four days a week from May 11 through June 4, 1993 in Kern County. Monitoring was scheduled to coincide with expected applications to grape vineyards. A total of 70 samples were collected from the background site at the ARB air monitoring station in Bakersfield and three sampling sites located in Arvin, Bakersfield, and Lamont. All samples analyzed had no detectable residues of captan (minimum detection limit = 0.013 $\mu g/m^3$; 1.1 ppt for a 24-hour sample) or THPI (minimum detection limit = 0.026 $\mu g/m^3$; 4.3 ppt for a 24-hour sample). Captan use in Kern County from 5 days before and for the duration of the monitoring study is shown in Figure 4.

Application monitoring was conducted in May 1993 before, during and for 72 hours after an application to an 18 acre grape vineyard in Tulare County. Captan was applied by ground equipment at the rate of 3.9 pounds of active ingredient per acre. Samplers were placed approximately 20 yards from the field on all four sides. A total of 41 samples were taken and analyzed for captan and THPI. Maximum positive detections for captan at each site ranged from 0.28 $\mu g/m^3$ (0.02 ppb) to 0.47 $\mu g/m^3$ (0.04 ppb). More than 95 percent of the total number of samples analyzed had no detectable residues (minimum detection limit = 0.013 $\mu g/m^3$: 1.1 ppt for a 24-hour sample). All samples analyzed for THPI had no detectable residues (minimum detection limit = 0.026 $\mu g/m^3$; 4.3 ppt for a 24-hour sample).



V. Risk Characterization of Captan

The SB 950 Toxicology Summary (dated 7/6/92) has no data gaps and noted possible adverse effects in oncogenicity studies in both rats (kidney tumors) and mice (duodenal tumors). Possible adverse effects were also noted in studies evaluating gene mutation, chromosome effects and DNA damage. The in vivo mutangenicity studies or studies which involved metabolism did not demonstrate adverse effects. The risk characterization document for captan is currently in preparation at both U.S. Environmental Protection Agency and DPR. If it is very conservatively assumed that average captan ambient air levels remain at less than 0.013 Fg/m^3 year around, the daily adult exposure would be: (0.013 Fg/m^3)(20 m^3) = 0.26 Fg. This is several orders of magnitude less than the Proposition 65 "safe harbor" level of 300 Fg per day.

VI. References

ARB. 1994. Ambient air monitoring for captan in Tulare County during Spring 1993 after an application to a vineyard. Test Report No. C89-041A, California Air Resources Board, Sacramento, California.

British Crop Protection Council. 1994. Captan. Pages 145-146 *in* C. Tomlin, Pesticide manual, 10th ed. Crop Protection Publications, Farnham, Surrey, U.K.

DPR. 1999. Pesticide label database. Department of Pesticide Regulation, Sacramento, California.

DPR. 1996. Pesticide use report. Department of Pesticide Regulation, Sacramento, California.

DPR. 1995. Pesticide use report. Department of Pesticide Regulation, Sacramento, California.

DPR. 1994. Pesticide use report. Department of Pesticide Regulation, Sacramento, California.

DPR. 1993. Pesticide use report. Department of Pesticide Regulation, Sacramento, California.

Kollman, W. and R. Segawa. 1995. Interim report of the pesticide chemistry database. Report No. EH 95-04, Environmental Hazards Assessment Program, Department of Pesticide Regulation, Sacramento, California.

Pack, D.E. 1974. The soil metabolism of carbonyl-^{14}C-captan. Vol. 103-142k, Registration Branch, Department of Pesticide Regulation, Sacramento, California.

Royal Society of Chemistry. 1994. Captan *in* Agrochemical Handbook, 3rd ed. Royal Society of Chemistry, Graham House, Cambridge, England.

Thomson, W.T. 1993. Agricultural Chemicals, Book IV: Fungicides. Thomson Publications, Fresno, California.

For additional copies of this fact sheet, please contact:

California Department of Pesticide Registration
Environmental Hazards Assessment Program
830 K Street
Sacramento, California 95814-3510
(916) 324-4100